

MIDEX AO Q&A

Updated 26 October 2001

This document may be found by selecting "MIDEX AO Q&A" at
<http://explorer.larc.nasa.gov/explorer/midexacq.html>

address all comments to
Paul Hertz, Explorer Program Scientist
paul.hertz@hq.nasa.gov

Categories of Questions

Science (S)
Proposals (P)
Missions of Opportunity (MO)
Enhanced Science Options (Phase F) (PF)
Launch Vehicles (LV)
Secondary Payloads (SP)
International Space Station (IS)
International Participation (IP)
Balloons (BL)
Miscellaneous (M)

Log of Questions

July 20: S-1, MO-1, PF-1, PF-2, LV-1, SP-1, SP-2, SP-3
July 27: P-1, P-2, MO-2, IS-1, IS-2, IS-3, IS-4, IS-5, IP-1, M-1
August 3: S-2, P-3, IS-0, IP-2, IP-3
August 9: P-4, IS-6, IP-1A, IP-4, IP-4A, IP-5
August 14: Preproposal Conference Q&A – S-3, P-5, P-6, P-7, P-8, P-9, P-10, P-11, MO-3, PF-3, LV-2, LV-3, LV-4, LV-5, SO-4, SP-5, IS-7, IS-8, IS-9, IS-10, IS-11, IS-12, IP-6, BL-1, BL-2, BL-3
August 16: P-12, SP-5 (revised), IS-13, IS-14, IS-15, IS-16, IS-17, IP-1 (revised), IP-1A (revised)
August 24: P-13, P-14, P-15, P-16, SP-4A, BL-0, BL-4, BL-5, BL-6, BL-7, BL-8
August 31: MO-4, P-17, P-18, P-19, P-20, BL-9, IS-18, BL-10, BL-11, BL-12, BL-13
September 11: MO-5, MO-6, LV-6, LV-7, IS-19
September 14: P-21, P-22, MO-7, MO-8, MO-9, LV-8, IP-7, IP-8
September 21: MO-10, LV-9, BL-14, BL-15
September 28: LV-10, BL-16, BL-17, BL-18
October 5: P-17A, P-23, P-24, P-25, MO-11, MO-12, MO-13
October 12: P-26, P-27, P-28, P-29, P-30, MO-14, LV-11, IS-20, IS-21, IS-22, IS-23, IS-14, IS-25, IS-26
October 19: P-31, P-32, P-33, P-34, LV-12
October 26: P-35, P-36, I-27, I-28

SCIENCE (S)

S-1: We are considering a proposal addressed to the Astronomical Search for Origins (ASO) theme as solicited in the MIDEX AO. Our science investigation might fall

outside of the nominal definition of ASO. However our investigation presents an ideal opportunity for developing and testing a new technique applicable to the search for extra solar planets. Is this sufficiently within the ASO theme of the MIDEX AO?

Scientists at NASA HQ were not convinced that this was legitimate ASO science. I can not therefore give you clear assurance that your proposal falls within the Astronomical Search for Origins Program or addresses the science goals of the search for extrasolar planets. Also I should note that the principal criterion for the Explorer Program is intrinsic scientific merit, not developing and testing techniques (AO section 7.2).

The science peer review will be asked to evaluate “the impact of the investigation on one or more of the OSS space science themes” solicited for this AO (AO section 7.2.1). If you choose to submit your proposal, the panel considering proposals addressing the search for extra solar planets or other ASO science goals will evaluate your proposal. They will evaluate how well your proposal addresses the ASO science goals, and on whether it is a compelling ASO investigation with intrinsic scientific merit.

S-2: The MIDEX AO indicates that one should not propose a mission with a science theme that overlaps the primary science goal of MMS. I gather that the primary science goal of MMS is magnetic reconnection, so proposals with science goals addressing magnetic reconnection will be disqualified. If I were to propose a mission to study processes related to magnetic reconnection, but not magnetic reconnection itself, will the proposal be disqualified?

There are both scientific and programmatic reasons why NASA prefers not to fly missions at the same time which address similar science questions. These are reflected in one of the MIDEX selection factors, which is to “reflect a balance among the applicable science themes ... within the context of other approved OSS missions” (MIDEX AO section 7.3). The MIDEX AO, therefore, excludes proposals for “Explorer missions that are intended to achieve science goals of certain specified missions already in the Strategic Plan for a similar time period” (MIDEX AO section 3.1).

NASA intends to issue an AO for MMS flight investigations later this year. A July 2008 launch date is currently planned for MMS. “Specifically, missions with science goals similar to the science goals of the Solar-B and STEREO missions, and to the primary science goal of the Magnetospheric MultiScale mission (i.e., magnetic reconnection), should not be proposed” (MIDEX AO section 3.1).

A blanket determination can not be given as to whether any particular area of investigation would involve science goals which are considered similar to the primary science goal of MMS. Such a determination would necessarily be based upon the proposal's complete description of the proposed science goals.

S-3: Please provide more precise criteria for determining if there is an overlap with Solar-B, STEREO, and particularly MMS.

No. See question S-2.

PROPOSALS (P)

- P-1: The AO calls for discussion of risk and mitigation plans both in the 7th bullet on page B-5 under Mission Implementation and again on page B-8 under Management and Schedule. Is there a difference in the requested discussion in these two sections? If not, do you want the discussion in both sections?**

The second sentence of Appendix B is, “The material presented is a guide for the prospective proposer and is not intended to be all encompassing.” You are “guided” to discuss risk and mitigation plans. You have flexibility over which section of your proposal contains the discussion of these subjects.

- P-2: The terms Co-Investigator and Collaborator are mentioned in section 3.4.2 of the AO. The reader is directed to Appendix B for details but collaborator is not mentioned there. This mention of collaborator resembles some language I have seen in NRA’s but I don’t know what is meant by it here. Can you explain what it means here (or tell me that it was included by accident and that we only have the PI and the Co-Is).**

Collaborators are defined in Section 3.4.2 of the AO as “other unfunded members of the proposal team.” A funded member of the proposal team is either a co-investigator (if his/her role is necessary to the proposed investigation) or is supported by a contract.

- P-3: It is customary to submit a color cover page with a picture of the flight system or similar graphic illustrating the proposed mission. I understand the AO to read that no changes are to be made to the electronically submitted cover page and no mention is made of any additional cover/title page in Appendix B. Can we include a color cover page and, if so, will it be counted against the page limit? Should it go before or after the electronic cover page?**

A hard copy of the electronically submitted cover page and proposal summary must be signed by the appropriate individuals and included with the submitted proposal, as specified in the AO (Section 6.3.1 and Appendix B).

It is permitted but optional to submit a graphic cover page (color or otherwise). It may be placed in front of the hard copy of the electronically submitted cover page and proposal summary. It will not count against the page limit so long as it does not contain any technical information not found within the body of the proposal. The optional graphic cover page must conform to the requirement in Appendix B that the proposal be submitted on recyclable white paper only.

- P-4: Page B-7, item 9 lists a variety of things a Mission of Opportunity must discuss. Page B-5 states this information “should be provided (in tables)”. The topics of item 9 do not appear to be amenable to a table. Do you really want them in tabular form?**

The phrase “should be provided (in tables)” is intended to give you permission and encouragement to include information in tables, where appropriate, without requiring that

the same data also be presented in the proposal narrative. You may present appropriate data in narrative form as well.

P-5: There is a rule-of-thumb that there should be one month of schedule reserve for each year of development. Is that adequate?

A guideline of a minimum of one month of schedule reserve per year of development is recommended in addition to adequately scoping the schedule for all development activities. The actual amount of schedule reserve which would be considered adequate will depend on the specific proposal particulars. Any amount of proposed schedule reserve must be justified as adequate.

P-6: Items 6 and 7 of Appendix B seem to be subsets of item 5. May we combine these into one table or narrative?

Yes. Appendix B contains guidelines for proposal preparation to assist the proposer in preparing a proposal. Information may be arranged and presented in a manner which most effectively conveys information.

P-7: Is there a minimum set of spacecraft and instrument information required beyond the data suggested in Appendix B?

No. However, more information is highly desirable to enable as complete an evaluation as possible.

P-8: Table B1 in Appendix B has no line item for Program Management. Is this an omission or, if not, where should that cost be accounted for?

It is not an omission. Table B1 is not structured like a Work Breakdown Structure (WBS), it is a higher level of abstraction for the major aspects of the mission. The costs of program management should be distributed among the major aspects of the mission (science, instrument, etc.) as appropriate.

P-9: Will the Explorer program consider extending the Phase A concept study to six months, like the original/typical Explorer concept study period, at the same cost?

No. The MDEX 1998 concept study period was 5 months. The concept study period for Discovery missions is 4 months. OSS is making a deliberate effort to align the rules for Discovery and Explorer by adopting best practices. In practice, the concept study period will be closer to 5 months because there is a period of a few weeks between selection and the official concept study kickoff.

P-10: Given that GSFC will chair and manage the independent system review, should we assume that the Explorer Program will pay for the system review teams outside of the cost cap?

The Explorer Program will pay for system level required reviews. These costs do not have to be included in the project cost plan. The project must budget for the cost of supporting these reviews.

P-11: How will the assessment be made of the descope plan (as described in Section 7.2.3 and Appendix B, Section D.1) when the descope plan is not developed until the definition phase (section 4.5)?

The information requested in Appendix B, and evaluated as described in Section 7.2.3, is far short of a full descope plan. Providing the information requested in Appendix B will be sufficient for the proposal phase.

P-12: Would this be OK? “Our Minimum Science Mission is Option A or Option B”? Is this one Minimum Science Mission, or is it two?

One of the evaluation criteria is the science value of the minimum science mission (see amendment to Section 7.2.1). You should propose a single baseline mission and a single minimum mission so that they can be evaluated. Explorer missions are PI-class missions. That means that you make the decisions and NASA evaluates those decisions.

P-13: Section 6.3.1 requires “a letter of endorsement signed by an institutional official from each known partner,” but Appendix B, Section I.1 requires “a letter of endorsement ...from... the major participants in the proposal.” Does this mean that a letter of endorsement from a major industry partner (e.g., s/c provider) is required but a letter of endorsement from a US co-I institution providing only part of an instrument plus data analysis is not required. Both are NASA funded activities. Am I correct in thinking that Appendix B supercedes Section 6.3.1?

In its entirety, Section 6.3.1 requires “a letter of endorsement signed by an institutional official from each known partner and each organization expecting to provide critical, no-exchange-of-funds contributions of hardware, software, facilities, services (including Co-Investigator services), etc., that provides evidence that the institution and/or government officials are aware and supportive of the investigation and will pursue funding if selected by NASA.” This requirement applies only to organizations providing no-exchange-of-funds contributions. Neither your S/C provider nor your NASA-funded instrument provider fall into this category.

However the requirement in Appendix B, that “letters of endorsement must be provided from ... the major participants in the proposal.” This LoE should validate that your S/C provider and your instrument provider support the claims you make for their cost and performance in the proposal. An instrument provider is a major participant in your MIDEX mission.

I should also point out that the first paragraph of Appendix B explicitly states, “In the event of an apparent conflict between the guidelines in this Appendix and those contained within the body of the AO, those within the AO shall take precedence.”

P-14: Section 3.3 of the AO states, “Selected investigations shall have a product assurance program that is consistent with the requirements of the ISO 9000 series.” As a science based non-profit organization, we are not certified to the ISO 9000 Series of standards. Our involvement will be associated with science management and software while our partners will be involved with the actual hardware development

and fabrication for the proposed effort. Will the ISO 9000 issue be a potential problem for our proposed involvement in a MIDEX project?

ISO 9000 “certification” is not a requirement for any selected mission. Full blown certification is a very formal and repetitive process. Usually institutions like NASA Centers (mandated by administrator) and large corporations (with an existing SR&QA/Business System infrastructure) engaging in international business can embrace it fully and/or find it advantageous from a business perspective. The next step down would be “compliance” to ISO 9000. Compliance would be achieved by an institution that internally implements all or most of the 20 or so ISO standard's elements, but which does not seek formalized certification (and upkeep thereof) from an outside approved audit house. Maintaining even this level of ISO style management system would be a stiff challenge to most smaller businesses or educational institutions.

So, what we are looking for is “consistence” with ISO 9000 requirements, that is an appropriately tailored, fitting subset of the ISO elements being addressed by and distributed among the management system(s) of the combined PI mission team. Only the ISO elements which fit into the limited scope of each contributing group's effort need to be addressed at that institution. Most team participants will need to address at least the few basic ISO elements like configuration control, failure reporting, and probably a few others (generally with systems already in place).

Perhaps the simplest way to envision what we expect, is to think of mission level “ISO element compliance” as a jigsaw puzzle comprised of dozens of individual pieces. The proposing PI institution has overall responsibility to control all of the pieces. That control is direct for work being done by the PI in-house, and indirect for efforts of a major corporate partner, a co-investigator, or a subcontractor. As one proceeds downward into the Work Breakdown Structure (WBS), the work scope in each branch gets smaller, and fewer of the ISO elements will make sense to implement at that level/institution. Many of the ISO requirements overlap those expressed separately in the SR&QA requirements document, so satisfying the SR&QA requirements also satisfies many ISO expectations.

It seems reasonable that if your partners are doing the vast majority of the flight hardware and software development work, it is their respective SR&QA management systems that will largely meet the ISO requirements for this mission. If science operations and ground based science software are the only tangible products from your group, then the ISO applicability would be little if any additional effort beyond the usual good engineering practices needed to provide and document a good product.

If your project is downselected for flight, then as a condition for Confirmation, the PI will present to the Explorers Program Office, in a deliverable Quality Manual, the description of the combination of SR&QA requirements implementation and that of the applicable elements taken from ISO. This Manual describes for the mission specifically how each applicable requirement is implemented, and at which institution(s). This is simply a written, somewhat detailed description of the PI's team vision of the “jigsaw puzzle” mentioned earlier.

P-15: Text font on the Fact Sheet. Must we use 12pt here, or can we use 10pt as in the Tables/Figures. Since the Fact Sheet is essentially a figure, we've been assuming 10pt text is ok.

Text and figure captions should be 12 pt; text within figures and tables can be 10 pt. Fact sheet is no exception.

P-16: We can find no prohibition in the AO against some pages being in landscape format. Some of our key tables are easier to read if they are wider, and the best solution we've found is to put these tables on a single 8-1/2 x 11 page in landscape format.

No prohibition against landscape pages.

P-17: Appendix B, Section I.1 concerns Letters of Endorsement. The first sentence states that any major participant must submit a letter of endorsement. However, the last sentence seems to say that funded Co-Is are exempted from the “major participant” category for the proposal phase. We are fine with the idea of not requiring funded Co-Is to submit a letter, but some clarification on the definition of “major participants” would help us to be 100% compliant.

It is impossible to write specific language which covers all cases, so we rely on fuzzy language like “major participants.” We want you, the proposer, to decide who are the major participants in your proposed mission. At a minimum, major participants includes all the people getting big bucks from NASA to make the mission happen, e.g. prime contractor, universities providing instruments, major sub-contractors providing unique components, etc. The important consideration is the second sentence, which states that the Letter shows NASA that the participant is committed to the proposal.

How about this rule of thumb: Assume that NASA doesn't know whether that particular participant is committed to what you say in the proposal. Should NASA be nervous about selecting the mission? If yes, then they are a major participant.

WARNING: That was only a rule of thumb, not a requirement. You decide who the major participants are.

P-17A: Given that Co-Investigators are always major participants (otherwise they wouldn't be Co-Investigators) I'm confused as to whether or not they need to provide letters of endorsement from their institutions.

Given that all of your Co-I's are major participants, then they all require letters of endorsement.

P-18 Question about Science Team identification (section 2.d, bottom of B-4). “Experience of all members of the science team must be described.” The word “all” is underlined. My reading of this has been “all co-investigators”, i.e., those who

have deliverables in hardware, software, or services to the mission, and NOT the “collaborators”, i.e., science team members who will undertake the scientific analysis of the data. Is this correct, or must I include the qualifications of the collaborators as well?

Actually, “all” does mean “all.” But the solution to your problem is found in the very next sentence of the AO. “Resumes of team members must be included as attachments to the proposal.” And check out the instructions for resumes on page B-10: “The resume should clearly show experience related to the job the individual will perform on the proposed investigation.” If they are important enough to be a named member of your science team, then you should assume that the peer review wants to know why.

P-19: A NASA project has agreed to give us some flight worthy spare parts from their development. In their letter, they will specify the parts, the parts' condition, and any conditions on our use of the parts. How should we take into account the value of these items against our cost cap?

See Section 3.5.2, Paragraph 2 of the MIDEX AO. You should include in your budget any mission unique costs associated with the modification and use of these parts. You do not have to account for the original development or replacement value of the parts.

P-20: The Appendix on Proposing Teams is limited to one page. However, it calls for some sort of certification as to the process of selecting partners. Do you want a separate certification letter? If so, where do we enclose it so as to avoid non-compliance?

The Certification Letter is in addition to the one page appendix. You can put it wherever you want. We'll find it (we really do read the proposals).

P-21: Our project management partner is asserting they will hold all reserve associated with JPL work on the project. What is the usual practice regarding NASA funding of project management partners? There have been suggestions that NASA should retain control of the reserve.

Explorer PI's are responsible for their missions (see Section 3.1 and 3.4.1 of the AO). PI's and their teams are allowed to propose and use their own management processes, including where reserves are held, how they are allocated, and how they are released. The plan for managing reserves will be evaluated as part of the feasibility for mission implementation (Section 7.2.3). It is up to you and your partner to propose a plan for reserves. NASA does not hold any additional reserves for Explorer projects beyond those reserves proposed by the PI as part of his/her budget proposal (Section 4.4).

P-22: A PI proposing to the MIDEX AO has asked a NASA project to provide some residual hardware to him. The project is willing to give this hardware away because it has no use for it. Presumably this is a good thing for the MIDEX program, because it will not have to pay for these items. We were intending to write a letter for the PI stating that he could have this hardware, so that he could credibly claim that he did not need to buy this hardware. Are we allowed to simply give the

hardware to this PI, or do we need to make some formal announcement to all proposers that we would offer the same hardware to them?

The proposer may be given a letter which says, essentially, that if he/she is selected, then the hardware will be given to them, but not before. The letter should come from the Program Office. A similar letter must be given to any PI who asks you for such a letter (see NFS 1872.404e).

P-23: It is not clear if the \$250K or \$450K for Phase A is NASA OSS cost or full cost.

The \$250K or \$450K for Phase A is cost to the Explorer Program, not full cost.

P-24: We want to make sure that civil service labor cost can be contributed to the effort is full cost is required.

Section 3.5.1 of the AO covers NASA costs which are considered contributed. "If any NASA costs are to be considered as contributed costs, the contributed item(s) or service must be separately funded by an effort complimentary to the proposed investigation and the funding sources must be identified."

P-25: Other AO's (Discovery, Pluto, etc.) have had explicit language where NIAT related costs (above and beyond normal costs) were to be described. If MIDEX does not have this language in its AO instructions, is there any need to discuss NIAT or provide associated cost estimates in our proposals? Also, have any additional funds have been set aside for MIDEX for NIAT related costs?

I am not aware of any AO's, including the Discovery and Pluto AO's, which had explicit language where NIAT related costs were to be described.

The MIDEX AO was written and released after the publication of the NIAT report. NIAT requirements have been built into the SR&QA document which may be found in the MIDEX Explorer Program Library (Appendix C, document 32). The NIAT report is also explicitly referred to in the MIDEX Explorer Program Library (document 38). You must discuss all SR&QA requirements including the NIAT requirements; NIAT requirements do not have to be discussed independently from non-NIAT requirements. The MIDEX Cost Cap includes the costs for meeting NIAT requirements. No additional funds have been set aside for meeting NIAT requirements; you must meet all requirements within your proposed mission cost. The costs of meeting NIAT requirements do not have to be identified independently of the costs of meeting all requirements.

P-26: Is there a per-year limit of dollar amount spent by the MIDEX office for the first mission (the one whose launch date is before March 2007)? Should we try to adjust our funding profile accordingly?

For the proposal phase, you should present your optimal funding profile. If it becomes necessary to place constraints on available funding in a particular fiscal year, then those constraints will be handled during the Phase A concept studies.

P-27: In Table B1 (funding information) what is category “Science” and how would this be different from data analysis in MO&DA?

Science includes the costs of your science team prior to launch. You may also include the costs of your science team after launch in this category. MO&DA costs are post-launch costs.

P-28: A required entry for the Fact Sheet is mission cost. Which mission cost? Cost to OSS (real year or F02?) or total mission cost (real year or F02?)? Do you want the budget profile as well, or just the bottom line?

There are no requirements on how you provide “mission cost” information on the Fact Sheet. All information is useful. However, if forced to make a choice because of space limitations, then a total is more useful than a profile, and FY02\$ is more useful than RY\$. Although “cost to OSS” may be slightly more useful than “total mission cost”, they are both important numbers for the purpose of succinctly portraying your proposal.

P-29: In regards to the MIDEX AO and the format for budgets, specifically referring to Table B1 on page B-13 of the AO, there is no line for management costs. I would include the following categories under management:

- Project Manager**
- Electrical Systems Manager**
- Mechanical Systems Manager**
- Principle Investigator (Science and Operations Manager)**
- Thermal Systems Manager**
- Quality Control**

How are we to incorporate these costs in our budgets? It seems strange to try to break these down by fractional time spent on each instrument or on s/c systems. It also seems that any real budget should spell out management costs -- which is often forgotten but represents a significant cost (~\$4M or more to the PI institution). Should we call out management as a separate item on our Table B1 or will we get find ourselves in trouble by thinking out of the box?

Table B1 is not structured like a Work Breakdown Structure (WBS), it is a higher level of abstraction for the major aspects of the mission. The costs of management should be distributed among the major aspects of the mission (science, instrument, etc.) as appropriate. (See Question P-8.)

P-30: What are we supposed to include under the line item "Science" on Table B1? Is this the theorists on the project prior to launch? Isn't all Data Analysis part of the "Science". Typically we assign a scientist part time to each instrument to supervise, make design decisions, and test the experiment. Is this under the science category? I currently have it under the instrument.

Science includes the costs of your science team prior to launch, typically for science planning. You may also include the costs of your science team after launch in this category. Scientists working on specific instruments (or other systems) should be charged to the development of that system. MO&DA costs are post-launch costs and

include mission operations. Sometimes the categorization of costs is arbitrary. (See Question P-27 in the Q&A.)

P-31: The AO indicates 20 pages for science and 20 pages for mission implementation. If my science is 22 pages and 18 pages for implementation, is this acceptable?

The only page limits given in the AO (Appendix B, page B-2) are given for individual sections of the proposal. These page limits apply to each individual section and can not be exchanged between sections. It is not acceptable to have the science section exceed the page limit in exchange for the implementation section having fewer pages.

P-32: On the MIDEX Budget sheet (B1), there are two NASA OSS totals. There is a row for NASA Capped Costs and a row for NASA OSS Cost (which includes phase F). The Cover sheet requests 4 numbers, the first 2 of which are the RY\$ and 2002\$ of NASA OSS Cost. Taking this literally, with the same language used in the budget sheet, the numbers requested would include the phase F costs. Do you want the numbers which include phase F (NASA OSS Cost), or the NASA Capped Cost (without phase F) for the cover sheet?

For the cover sheet, please use the capped, not-Phase F costs. This is the cost of your baseline, non-enhanced science mission.

P-33: Are bridge funds phase A or B? This is for the cost sheets.

Bridge funds are an advance on Phase B funding. See question MO-9.

P-34: We have some concern that normal deliveries by Federal Express may be disrupted by the additional security mandated by recent deliveries of toxic materials by mail. In the event delays in delivery result from such precautions, will this be taken into account in determining whether or not the sender met the indicated deadline for receipt at the proposal acceptance address?

NASA requires that all proposals be received by the revised deadline. The proposal extension should be sufficient to account for any changes in delivery service times due to security precautions. You are responsible for assuring that you ship your proposal in time to be received by NASA before the revised proposal deadline.

If an emergency happens at the time of the proposal deadline which affects the ability of delivery services to meet their expected delivery schedules, NASA will consider at that time whether any relief from the deadline should be granted.

P-35: The letters of endorsement are for the partners of the PI's institution, and the PI's institution only needs the cover page or equivalent to be signed by the Contracting Officer to shows their endorsement --- right?

Yes. That signature on the front page commits the proposing institution to the proposal as well as to the certifications.

P-36: I just wanted to get clear the procedure for the Foreign Letters of endorsement that aren't due until Nov. 9. Do we just send them to the same address as the full MDEX proposal?

See section 6.3.1 of the AO. It turns out that the address is the same (compare with Section 6.3.3).

MISSIONS OF OPPORTUNITY

MO-1: Does a Mission of Opportunity sponsored by a non-US agency have to respond to the orbital debris appendix?

NASA can not require non-US agencies to meet its requirements. However NASA does expect non-US agencies to meet their own requirements. You should tell us what, if any, requirements the sponsoring agency places on orbital debris for its own missions.

You should respond to the orbital debris appendix as required. However a possible response to “whether you anticipate that spacecraft disposal will be required” is that it is not required because NPD 8710.3 does not apply to non-US spacecraft.

NASA is interested in public safety. NASA is interested in whether a mission poses a risk to health and safety even if it does not violate any regulations or requirements.

MO-2: In section 5.1 the AO requires “the proposing investigator to provide evidence in their proposal that the sponsoring organization intends to fund the primary host mission.” A Mission of Opportunity proposal to this AO, if successful, will result in a Phase A study. That Phase A study needs to run more or less concurrently with the Phase A study of the host mission. As is the case with NASA, the sponsoring organization for the host mission does not commit to fund the entire mission until they have evaluated the study that results from Phase A. Is the fact that the host mission has been selected for a Phase A study enough to show the intent to fund the primary host mission?

It is the proposing investigator's responsibility to provide evidence in his/her proposal that the proposed host mission is real and that the opportunity to participate via the Mission of Opportunity mechanism is viable. A mission is not real without funding. The AO requires that the proposer provide evidence that there is a funding source for the primary host mission.

In the situation described, the evidence could be a letter from the agency which is considering sponsoring the primary host mission. The letter could indicate that the primary host mission will be funded subject to the results of the Phase A study (or whatever the constraints are). If the potential host mission is competing for a flight opportunity, then that should be made clear. It is most helpful to NASA in the MDEX decision making process that the evidence provided be as specific as possible about the circumstances under which the primary host mission would be approved and funded and about the anticipated timetable for the necessary decisions and commitments to be made.

MO-3: Is a Mission of Opportunity proposal required to identify a minimum mission?

No. Section 4.5 refers only to MIDEX proposals.

MO-4: I will be proposing a Mission of Opportunity on a non-OSS host mission. When I discuss baseline mission and descope options, I am assuming that this would apply only to the NASA-funded portion of the instrument. Is that a correct assumption?

The requirement to identify a baseline mission and a minimum science mission (AO section 4.5) applies only to full MIDEX proposals and not to Mission of Opportunity proposals. Any discussion of descope options (for instance, to mitigate risk, see AO Appendix B, section F) should apply only to the NASA-funded portion of the instrument.

MO-5: What is the selection process/timeline for Missions of Opportunity? Does a MO go through the Phase A downselection process, or does it get selected (pending confirmation approval) next spring?

The assumption is that the MO goes through the downselection process (see Section 7.4.4 of the AO) and may, or may not, be selected for flight at that time. However, under extraordinary circumstances, NASA has selected a MO for flight without going through the downselection process.

MO-6: I'm working on a Mission of Opportunity proposal for a foreign host mission. The host agency will be doing instrument selection possibly as early as mid-2002. Does the Mission of Opportunity selection time line preclude NASA making a decision by then? When can I expect a yes/no decision?

NASA hopes to make selections for Phase A studies in April 2002 and has a goal of making downselections for flight in December 2002 (see Section 1.3 of the AO). If you require a commitment from NASA by mid-2002, then you may state in your proposal that a decision is required by mid-2002. The need for an early decision will be evaluated, so your statement should be accompanied by appropriate letters and other demonstrations of justification. NASA has the option of selecting a Mission of Opportunity for flight prior to Phase A. Should you convince NASA that you require a commitment for flight by mid-2002, and should NASA be unwilling to select your proposal for flight without a Phase A study, then that would be sufficient reason not to select your proposal.

MO-7: Table B2 of Appendix B contains no section on "Contributions" as suggested in the text of page B-8, last line of page. Should we simply build it in or is it not needed.

You may build it in (modeled on Table B-1).

MO-8: I assume for what seems obvious reasons that "Concept Study" in Table B-1 refers only to Phase A.

Correct.

MO-9: I am confused about what "Bridge" funding means for the mission of opportunity.

Bridge funding is described in Section 7.4.2. It means the same for a Mission of Opportunity as it does for a MIDEX: a two-month advance on Phase B funding provided after downselect to those missions selected for flight.

MO-10: Section 3.2.1 of the AO describes general data policies for Explorer missions. I am preparing a Mission of Opportunity proposal for a foreign mission where the data policies will be determined by the foreign host. It is my current understanding that this NASA policy is not in accord with the foreign host's data policy. How do you suggest I respond on this point?

NASA understands that the data policies will primarily be defined by the host mission. Nevertheless, NASA expects that at least the data from your contribution, if not the entire mission, will be made available to the U.S. scientific community in a timely way (see Section 5.3 of the AO). You should endeavor to establish data policies with the foreign host that maximize the science return from the NASA contribution to the mission, if not the entire mission. In your proposal, you should describe exactly what those data policies are for both your contribution and the rest of the mission. These data policies are an explicit evaluation criterion (see Section 7.2.2 of the AO).

MO-11: We are proposing a balloon mission under the MIDEX AO as a Mission of Opportunity. In “G. Cost and Cost Estimating Methodology” Missions of Opportunity are asked to provide contributed costs in the lower part of table B2. There is no lower part to table B2. We can try and adapt table B1 but are concerned that this is not really what is wanted. Can you enlighten us on how we should proceed?

There are two parts to this answer. (1) LDB proposals should use Table B1. Section 5.5 of the AO states, “In all other regards [except that NASA may or may not select a mission and the cost cap], the proposal requirements for a LDB Explorer mission proposal are the same as for a MIDEX proposal.” (2) The lower part of Table B2 was inadvertently left off of the published table. If there are contributions to a non-LDB Mission of Opportunity proposal, then you should add appropriate lines to the bottom of Table B2. You may use Table B1 or the upper part of Table B2 as models.

MO-12: In reading Section 5.7, it is not clear that Mission of Opportunity costs must be reported on a full costs accounting basis. It is not specifically called out although it is our plan to prepare estimates in full cost.

For evaluation and selection purposes, it would be most useful if costs are shown in two ways. (i) Full cost basis. (ii) Cost to Explorer Program, i.e. excluding civil service and other contributed costs. See also question P-24.

MO-13: Can you direct me to a document listing required/proposed deliverables for a Mission of Opportunity, since the hardware is not delivered to NASA, or

There is no specific list of deliverables for either MIDEX or MO missions. You should propose appropriate deliverables for your mission based on the requirements in the MIDEX AO and the supporting documents in the MIDEX Explorer Program Library.

MO-14: If a non-OSS NASA office contributes to a Mission of Opportunity, does the contribution cap (33% of the OSS cost) apply to actual expenditures or the full cost accounting value?

The 33% contribution cap only applies to MIDEEX missions. (It is mentioned only in Section 4.3.3. Section 4 of the AO only applies to MIDEEX missions not Missions of Opportunity.) There is no cap on contributions to Missions of Opportunity specified in the AO (except for LDB missions; see question MO-11).

However Section 3.5.1 does require that full cost accounting be used for NASA civil servant costs. (Section 3 of the AO applies to all proposals.) It also notes that the source of the non-OSS NASA contribution must be clearly identified. It will be necessary for the non-OSS NASA office to endorse the proposed contribution through a Letter of Endorsement from an appropriate official.

ENHANCED SCIENCE OPTIONS – PHASE F (PF)

PF-1: I am not clear on Phase F and its relation to technical merit and feasibility. The AO clearly states that science enhancements do NOT count toward scientific merit, yet it does count towards feasibility. How can extended missions and GO programs contribute to feasibility and not science, especially when they “kick in” after the mission begins?

The first criterion (science merit) is about the science merit of the baseline mission (AO section 7.2.1). The second criterion (technical merit and feasibility) is about the merits of the mission proposed to accomplish the proposed science goals (AO section 7.2.2). Clearly this includes choice of instrument, mission design, etc. However the option to augment the science mission through various science enhancements can also be a technical merit. If the science peer review considers the science enhancements to offer real science value beyond the baseline science mission, then that is a strength for the proposal.

The possibility to augment missions is not new. The new aspect is that we want to review science enhancement options up front as part of the total mission evaluation rather than on an ad hoc basis.

PF-2: Can Phase F money be spent before launch to prepare for Phase F activities, and if so, are there any limits on the amount (or fraction) spent then?

All of the rules for Phase F are given in section 3.2.2 of the AO. The AO says, “Note that funding for Phase F activities prior to Phase E should be minimized.” So Phase F money may be spent before launch to prepare for Phase F activities. There is no set limit or fraction, but your proposal will be evaluated to see if the pre-launch costs are justified and minimized.

PF-3: Is there any provision to include extra material for the Phase F plan which does not count toward the page count limit, e.g., a Phase F appendix?

No.

LAUNCH VEHICLES (LV)

LV-1: Is it possible for missions to propose to contract directly with Lockheed Martin for procurement of the Athena? A KSC oversight role in such a procurement would be assumed.

Only launch vehicles which are available on a NASA Launch Services contract may be purchased for MIDEX missions (AO section 4.1.1). It is not possible for missions to propose to contract directly for launch vehicles. For this MIDEX round, the Athena is not available through a NASA Launch Services contract.

LV-2: Is there a realistic chance that the Athena launch vehicle will be allowed in Phase A?

There are no plans to add additional launch vehicles to the NASA launch vehicle contracts between now and the anticipated end of Phase A.

LV-3: Launch vehicle costs in the MIDEX library are given in RY dollars leading to a total cost. How should the costs be deinflated to determine the FY02 cost of the launch vehicle?

Use the inflation rates given in Table B4 to convert between RY costs and FY02 costs.

LV-4: Are there any opportunities for equatorial launches, such as from Kourou?

Launches with a Pegasus from Kwajalein are offered under a NASA launch services contract. Contact Darrell Foster, the point-of-contact identified in the *MIDEX Expendable Launch Vehicle Services Information Summary* document in the MIDEX Program Library, for information on potential additional opportunities.

LV-5: Will KSC turn a contract with a launch services provider to do coupled load analyses during Phase A or Phase B, or must the PI wait for Confirmation?

Yes, coupled load analyses can be arranged by KSC. The cost of the coupled load analyses must be in the project budget during the appropriate phase of the mission.

LV-6: Can you define the difference between a primary and secondary shuttle payload?

As stated in Section 3.3.4 of the AO, the Space Shuttle Office determines whether a payload is a primary or a secondary payload. Although there are rules of thumb based on mass and volume for determining the status of a payload, the principal criterion is whether the payload is the reason for a Shuttle launch. Simplistically, if a Shuttle launch is scheduled for a payload, then that payload is the primary payload. The primary payload drives the Shuttle mission requirements (launch schedule, orbit, etc.). If a Shuttle launch has already been scheduled to carry a primary payload, and another payload is added to take advantage of available resources (e.g. mass, volume) without

impacting the Shuttle's ability to meet the primary payload's requirements (e.g. the orbit requirements are compatible), then that payload is a secondary payload.

MIDEX missions may be proposed as either primary or secondary payloads. As stated in Section 3.3.4 of the AO, proposers must work with the Space Shuttle Office to identify potential flight opportunities. For a primary payload, this means identifying a funded Shuttle flight in the time period covered by this AO which does not have a primary payload. For a secondary payload, this means identifying a funded Shuttle flight in the time period covered by this AO which has a primary payload and has appropriate resources available to carry the MIDEX mission as a secondary payload.

When the AO was written, it was assumed that any Shuttle launched, free flyer MIDEX mission would be proposed as a secondary payload. As stated in Section 3.3.4 of the AO, an investigation classified as a primary payload must demonstrate compliance with the Space Shuttle Use Policy set forth in 42 U.S.C. 2465a. Also, although OSS can select a MIDEX mission for flight, the decision to launch the Shuttle is an Agency decision. Therefore, a MIDEX mission classified as a primary payload, and selected for flight by OSS, would still need to be selected as the primary payload for a Shuttle launch by the Office of Space Flight. Shuttle launches are traditionally reserved for missions which are larger, more expensive, or more strategic than MIDEX missions. It would be unusual for a Shuttle launch to be driven by the requirements of a project the size of a MIDEX project.

LV-7: Who bears the launch cost of a primary or secondary shuttle payload?

Shuttle launches are funded through the Office of Space Flight. All mission unique costs must be borne by the MIDEX project (Section 4.3.2 of the AO).

LV-8: We seek a clarification of Shuttle launch costs, specifically if there are costs and, if so, if there are configuration specific break points in that launch cost.

Shuttle launches for NASA sponsored payloads are funded through the Office of Space Flight (OSF). Basic Shuttle launch service costs are not charged to the NASA sponsoring office (i.e. the Office of Space Science or the MIDEX project). All mission unique costs must be borne by the MIDEX project. There are not configuration specific break points in these mission unique costs. For more information, contact the points-of-contact identified in the *MIDEX Space Shuttle Launch Opportunities* document in the MIDEX Program Library.

LV-9: My proposal is to participate in a foreign mission that will be launched to ISS on the Space Shuttle; however all transportation, deployment and retrieval arrangements are being made by the host agency. Do I have to “identify the potential flight assignment and provide evidence that the Space Shuttle Office is aware of the proposal and will pursue manifesting the investigation, if selected, during the Phase A concept study” (Section 3.3.4 of the AO)?

No. All ISS allocations, including those belonging to foreign agencies, come with an appropriate Space Shuttle allocation for delivering/retrieving a payload to/from that allocated resource (e.g. attach point). The appropriate Shuttle manifesting is part of the

ISS assembly schedule which includes delivering payloads to attach points and interior bays. During Phase A, you must show that your development schedule is consistent with both the foreign agency's development schedule and with the current ISS assembly schedule and Shuttle manifest.

LV-10: I am interested in the possibility of launching from a low latitude site. Since Pegasus launches from Kwajalein are offered, would a Taurus launch from Kwajalein would be a possibility? I understand that there would be cost and schedule implications, but I suspect that they would be well worth allowing for, since the science return would be so much greater for our mission.

Unfortunately, there is not a readily available answer to your question. This is not a capability that we currently have under contract, nor has it ever been done before. Technically, it is probably feasible; however, the logistics and non-recurring engineering/analysis are significant from a cost perspective. Unfortunately, there is no funding available to authorize Orbital to perform the required feasible study to provide a realistic cost estimate. I have notified Orbital of the question and I have left it up to them whether they can/want to study it using their own resources. From phone discussions with them on the subject, it sounds like they are interested in looking at it; however, I cannot guarantee the timeliness of the response.

LV-11: The document currently on the Explorers library regarding ELV launch services covers launches through December 2006. The final version of the MIDEX AO specifies launch opportunities in March of 07 and March 08. There appears to be a need for updated the ELV cost tables for the March 07 and 08 launch opportunities. We are uncertain what to use for ELV launch service costs in RY\$ as required for Table B1 and B3 of the AO. Can you please provide guidance?

A document has been added to the MIDEX Explorer Program Library at <http://explorer.larc.nasa.gov/explorer/mel.html>: *Updated Delta II Launch Costs for March 2007 and March 2008 Launch Dates*. This document gives real year launch costs for Delta II launch services for a March 2007 and a March 2008 launch date.

It is also acceptable to estimate launch costs from the previously provided document *MIDEX Expendable Launch Vehicle Services Information Summary*, which provides real year launch costs for a December 2006 launch date. For proposal purposes, it is acceptable to estimate launch costs by delaying the given profile an appropriate number of months and inflating the costs.

During Phase A, the ELV Launch services Office at KSC will generate appropriate individual cost profiles for the Phase A study missions.

LV-12: Since Pegasus launches from Kwajalein are offered, what is the possibility of a Taurus launch from Kwajalein? What would be the cost and schedule implications?

Orbital Science Corporation (OSC) has assessed this scenario, and NASA/KSC has reviewed the assessment of a low-inclination Taurus launch. The estimated cost of this approach could be as high as \$5.5M over-and-above the launch service figures that have

been provided in the AO. Please keep in mind that this estimate is conceptual in nature and would be the first time for using this approach (i.e., there are still some unknowns that exist); however, it appears to be technically feasible and the appropriate logistical aspects have been taken into account by OSC. This option is based on a launch out of the Kwajalein Atoll; however, if other low-inclination launch sites become available, we may pursue one of those, if it is advantageous to a mission. This decision would be coordinated with the project ahead of time.

OSC has noted that an access tower may be needed for late access to the spacecraft. The standard Taurus launch service uses a "clean pad" approach with no permanent service tower, like many other ELV's. Again, this is something that has never been done before on the Taurus program and is conceptual in nature (i.e., there are still some unknowns that exist); however, experience from other programs has been taken into account in this estimate. The estimated cost for this capability is \$1.25M, which should be considered additive to the launch service figures provided in the AO and the \$5.5M above.

SECONDARY PAYLOADS (SP)

SP-1: If we can get a secondary mission to fly with us, we can afford (both mass and budget) to fly a significantly enhanced science mission. Can we propose a baseline mission and describe the enhanced mission as an option to be studied during Phase A?

You may propose this. However the scientific merit will be evaluated only for the baseline mission and not for any enhancements (AO section 7.2.1). The baseline mission will also be evaluated for mission feasibility (AO section 7.2.3). You must choose carefully which mission is your baseline.

SP-2: If we opt for the enhanced mission, then we can accommodate a secondary payload. We also require funding from the secondary payload to stay within the cost cap. Should we identify a secondary payload or does NASA/OSS want to take advantage of this launch opportunity?

You may propose it either way. Dependence on a secondary payload contributes to risk; one obvious risk is that they may not be ready in time and you might suffer launch delays. Another is the technical risk of accommodating a secondary payload. If you propose that OSS identify the secondary payload, then your feasibility evaluation will also include an assessment of the risk that a payload with adequate funding and an appropriate schedule will be identified. In either case, your feasibility evaluation will include an assessment of the technical, schedule, and cost risk to your mission that is associated with the secondary payload (either identified or not). In either case, if your investigation is selected for a Phase A study, you must provide evidence as part of the concept study report that the secondary payload has agreed to support your proposed launch date (AO section 4.1.1). It is suggested that you address these risks in your proposal in the same manner that a Shuttle proposal addresses the risks of externally caused launch delays (AO Appendix B, section F).

SP-3: Does NASA/OSS want to take advantage of this opportunity?

There is no evaluation or selection criterion which awards strengths to a mission for offering additional launch capability to a secondary payload. The primary evaluation and selection criterion is the scientific and technical merit of the proposed MIDEX mission. The selecting official can take advantage of all programmatic considerations when making the selection. The overriding consideration for selection will be to maximize scientific return within the available budget.

It is part of the philosophy of PI class mission programs like Explorer and Discovery that the proposer make decisions of this kind and submit his/her best option to NASA for evaluation.

SP-4: If I had an opportunity to partner with a non-Explorer program within OSS, do the resources contributed (e.g., a shared launch) by this other program count toward the cost cap?

Yes. Contributions from within OSS count toward the cost cap even if they are not from the Explorer program. However a shared launch does not have to be considered a contribution. If both projects pay for their own portion of the launch costs, then no contribution is involved.

SP-4A: How about a shared spacecraft?

Cost sharing a spacecraft with an independent project is no different (from a rules point of view) from cost sharing a launch vehicle with an independent project. In both cases, the two projects pay their share of the costs. The costs of the non-MIDEX project are NOT considered a contribution to the budget of the MIDEX project.

SP-5: What about the option of flying instruments as piggy-back payloads on a commercial satellite? Has this approach been considered in the past?

REVISED ANSWER (16-Aug-01)

Yes. The UNEX mission CHIPS was proposed and accepted to fly piggy-back on a commercial satellite. This is permitted. If the proposal meets the cost cap and other AO requirements, it can be proposed as a Mission of Opportunity.

INTERNATIONAL SPACE STATION (ISS)

IS-0: Specific questions regarding fields-of-view for attached payloads on the ISS should be emailed to Betsy Park at bpark@pop400.gsfc.nasa.gov. Each question will be answered on a best effort basis as time permits. Extremely detailed questions requiring substantial amounts of computer run time may not be answered in the proposal time frame. The goal of the ISS Research Program Office is to provide an equitable level of service to all proposers.

IS-1: Are there EXPRESS pallets planned with a nadir view? Are these reserved for the Office of Earth Science (OES)?

There are two planned nadir pallets. OES has several placeholder allocations on the nadir pallets, but OSS does not at the present time. However, if OSS is interested in an allocation on a nadir pallet, the OSS/OES Office for Space Station Utilization can work to arrange that.

IS-2: If NADIR side EXPRESS pallets will exist, would such pallets be available in the MIDEX timeframe, 2005-2006?

The first pallet to be launched will be one of the nadir pallets. Current indications in ISS planning would support a 2005 launch for the first pallet. It is not clear yet if the second nadir pallet would launch later than 2006. Reference Section 5.1 of the MIDEX AO for requirements on Missions Of Opportunity launch dates.

IS-3: Can single experiment locations on a nadir viewing EXPRESS be made available to MIDEX mission of opportunity proposals?

If OSS chooses to select a nadir viewing payload, allocation arrangements could be made to accommodate that payload. It might come to an issue of flying on the first or second nadir pallet, however.

IS-4: How else might access to such a nadir view be accomplished?

The Japanese Experiment Module Exposed Facility (JEM-EF) also offers nadir views to attached payloads. Most of these sites have simultaneous zenith and nadir viewing. Reference the ISS document in the AO library for details on JEM-EF accommodations. OSS currently has allocations on the JEM-EF as well.

IS-5: In the ISS Research Opportunities Document located in the MIDEX Library, there is mention of an ISS data recorder capability for periods of signal loss. I cannot find any details concerning what those capabilities for signal (data) recording will be. Is there additional information available?

The High Rate Communications Outage Recorder (HCOR) is supposed to be installed prior to the launch of the NASDA JEM. It will have a capacity of 220 Gbits. It can accept data at rates up to 95 Mbps. Playback can also be up to 95 Mbps, however, the space to ground link is currently limited to about 45 Mbps. The HCOR use is scheduled and is shared by all users. Note that this means that it does not protect against data loss from unscheduled loss of communication.

Note that this data recorder is not sufficient nor is it intended for data recording between downlink opportunities. The paper "*Onboard Data Systems Physical and Operational Capabilities*" contains additional information and will be placed on the ISS Research Program Office website at <http://rpo-iss.gsfc.nasa.gov/>.

IS-6: We would like to propose a ISS payload that needs the capabilities of the full truss site on station. The budget would likely be within the Mission of Opportunity (MO) guidelines. However the AO does not include the full truss site option for an MO. The question is whether the full truss site option can be used for an MO project?

The MIDEX AO has been amended to allow MO investigations to be proposed for the full truss site. Please see the amended MIDEX AO for the exact requirements.

IS-7: Can I provide a free flyer that would keep station with the ISS 2-5 km away and therefore use the ISS for its primary communications link?

No. This opportunity is not offered in this MIDEX AO. The MIDEX team is not aware that the ISS plans to develop this capability in the future. However should the ISS develop this capability in the future, OSS will consider soliciting proposals in a future AO which take advantage of that capability.

IS-8: Will you conduct the scientific review of ISS MO proposals independently of programmatic decisions about the ISS schedule?

Yes. The science peer review will consider whether the proposed mission offers good science and whether the ISS is the appropriate place for the mission. The science peer review will not consider the ISS assembly schedule.

IS-9: When will the *ISS Attached Payload Support and Interface Module Accommodation Specification* document (mentioned in the *MIDEX ISS Attached Payloads Support Opportunities* document) be available?

As of August 10, the document is expected to be available by August 17.

IS-10: To whom should questions regarding the PSIM be addressed? Will all such questions and answers be posted?

Questions should be addressed to Ruth Carter, the point-of-contact identified in the *MIDEX ISS Attached Payloads Support Opportunities* document in the MIDEX Program Library. Only questions of a programmatic or policy nature will be posted. Questions concerning the technical implementation of your mission concept will be kept confidential and treated as proprietary information.

IS-11: Do the PSIM GFE services include instrument software IV&V as part of the total flight system verification and validation?

No. Instrument specific activities, including software IV&V, are not included in the GFE services and must be included elsewhere in the proposed cost.

IS-12: Why does the PSIM have a flat top envelope instead of a domed one that conforms to the Shuttle cargo bay? Are we allowed to provide our own PSIM with a possibly larger envelope?

The PSIM is offered as GFE only in the configuration described in the *MIDEX ISS Attached Payloads Support Opportunities* document in the MIDEX Program Library. It may not be customized beyond any options discussed in that document. If the PSIM does not meet your needs, you should propose your own carrier and attach structure for your ISS attached payload.

IS-13: Do we need to provide any costing information for the communication system (i.e. SOMO) or do we just include the TREK WS cost as the whole communications costs?

Your costs for the communication system includes, but may not be limited to, 1) the TREK workstation (including the hardware it's hosted on), 2) the facility you house it in, if necessary, and 3) your connection costs to MSFC via dedicated line, internet, etc. You do not cost the ISS system between MSFC and the ISS vehicle.

IS-14: What GFE must we account for in the cost for an ISS truss site (e.g. PSIM) and where do we find the costs?

The costs for the GFE option for the ISS truss site are contained in the *MIDEX ISS Attached Payloads Support Opportunities* document in the Explorer Program Library for this AO. Use of this GFE is optional and up to the proposer's discretion. GFE hardware provided by the ISS Program includes the Berthing Cue System (BCS), its associated harnessing, and the BCS required Power Video Grapple Fixture (PVGF), and is provided by NASA at no cost to your mission.

IS-15: Is the shuttle launch and standard KSC payload processing considered free?

Reference Section 4.3.2 of the MIDEX AO for full truss payload launch costs and Section 5.7 and the *ISS Research Opportunities* document in the Explorer Program Library for Missions of Opportunity. The shuttle launch and standard KSC payload processing are not charged to your mission. You are responsible for any mission unique and integration costs.

IS-16: Do we need to address the return flight to return the pallet?

If you are referring to the EXPRESS pallet, it will not be returned. Individual payloads will be removed and returned on ISS Program provided carriers. Regardless of the payload site, the return of the payload must be addressed and support must be provided for retrieval. The PI's MO&DA budget must include the support costs necessary for the PI and his/her team to perform the retrieval activities such as: flight and ground safety reassessments and delta reviews, ground handling of the hardware upon return, developing any new procedures, and deintegration and return of any ISS carrier hardware or other government-owned hardware to a government-designated facility. There is no charge to the PI for transportation of the payload back to Earth on the STS.

IS-17: What type of mission lifetimes should we design for using the truss site?

Payloads should design their lifetime to meet their science requirements. There is no specified maximum time allowed on ISS sites. Actual life on orbit will be determined by OSS and will depend on the amount of time required to obtain the proposed science data and the priority of other missions waiting for flight.

IS-18: Is there any information about the ISS thermal environment other than the fluxes and beta angles given in 57003?

Boeing has given us the extraneous IR inputs that apply to the ram and wake faces of the S-3 site. Also, we have generated a thermal model of the ISS - reduced from an early all-up model. Note, all Beta angles are possible. For further information, contact Bob Eby at 301-902-4080 or rebby@Swales.com.

IS-19: What is the power allocation for the ISS truss site that we should design for?

Our best guidance at this point is to assume no more than 2kW for a total maximum power allocation. We cannot guarantee this allocation as the predicted resource situation on the ISS is still fluid.

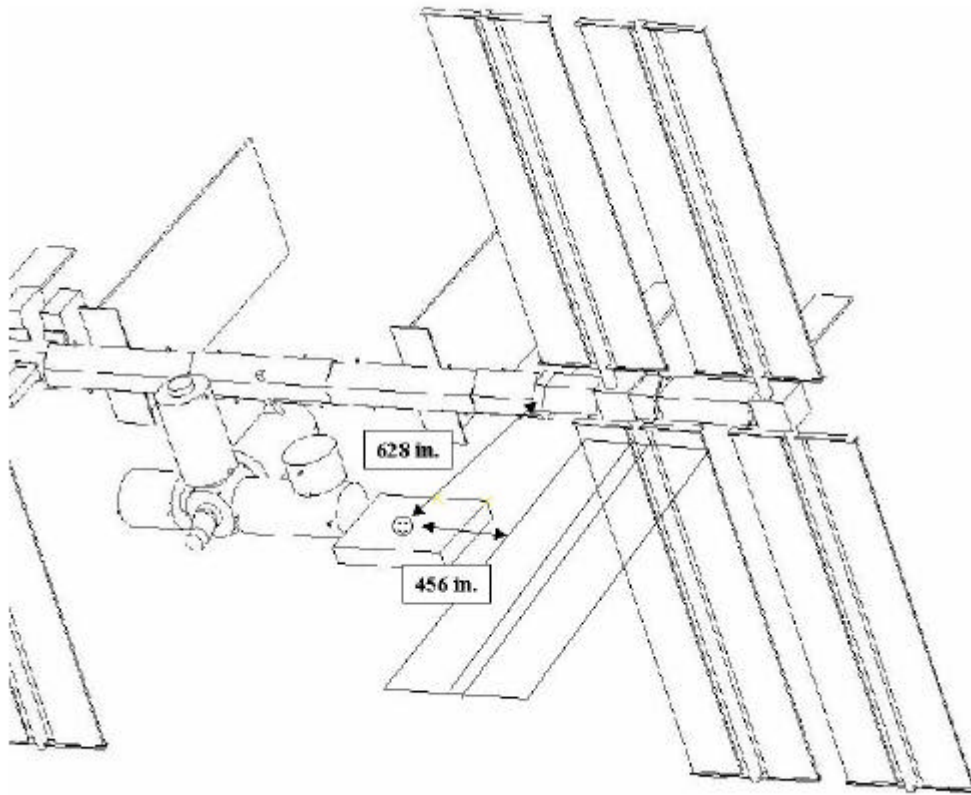
IS-20: In Section 5.4 of the AO it states, “Payloads for the Columbus External Payload Facility (EPF) and nonstandard payloads are not being solicited through this AO.” We are proposing participation in an ESA mission that will attach a payload to this external payload facility. Since we are not proposing the payload, I presume this statement does not exclude our proposal. Is this correct?

OSS does not currently have allocations on the EPF. A proposal where you partner with an organization that does have an allocation on the EPF, and you propose to use their allocation with their permission, is permitted. A proposal of this type would be a traditional Mission of Opportunity (where you are proposing for OSS participation in a non-OSS mission) governed by Section 5.1 of the AO, rather than an ISS Mission of Opportunity (where you are proposing to fly a small, OSS-sponsored payload using an OSS allocation on the ISS) governed by Section 5.4 of the AO.

IS-21: What is the expected cost of the grapple fixture and FRAM for JEM-EF payloads?

The interface hardware required for a JEM-EF payload is a modified FRAM (specific design for the JEM-EF), a Payload Interface Unit (PIU), and a Flight Releasable Grapple Fixture (FRGF) for interfacing to the JEM arm. The modified FRAM and PIU will be provided by the ISS Program to payloads with the expectation of returning the hardware to the Program post-flight. The FRGF is not completely decided at this point, but JSC has high expectations that it will also be provided under the same provisions. The cost of an FRGF is \$60K. As soon as we have a clear decision on the FRGF, we'll update this answer.

IS-22 Could you provide rough (+/- 1-2 meters) estimates of separation from the center of the JEM-EF platform to the nearest point on an ISS solar array and the main truss gimbal for the solar arrays?



IS-23 Can you clarify the launch opportunities for JEM-EF attached payloads which should be used for planning or provide a point of contact for such information? Specifically, it looks like the current first opportunity is no earlier than June 2005. Is this correct? Is there a schedule for additional opportunities to complete the population of the JEM-EF which still meet the September 2007 requirement?

The AO, Section 5.4, states that the first JEM-EF payload opportunities are in 2005-2006. The date currently being looked at is roughly September of 2005. Due to the current state of the ISS Program, however, we DO NOT have a baselined assembly sequence for this timeframe and do not anticipate getting one this calendar year. There is not a schedule for additional opportunities at this time. That will be worked in the upcoming months.

IS-24: Is information available on the interface requirements for the Universal Logistics Carrier and how might it be obtained?

The design of the ULC is tied to the design of the Express Pallets which has not been finalized with Brazil, the provider. Our best advice at this time is to assume the ULC interfaces will be the same as the Express Pallet, except that you will only get power for heaters and not command or telemetry. This heater power will be 28 V contingency power while in the shuttle, then 120 V contingency power while on orbit until you are transferred to the JEM-EF. There will be periods of no power during translations.

There was a specification document for the ULC (dated draft, 8/13/99), but it is not up to date with the latest specification changes to the Express Pallets. There has not been an

update yet to the ULC Spec doc. Therefore, assume the spec for the Express Pallets defines the interfaces for the ULC. The latest version of this document, (SSP 52000-IDD-EPP, June 5, 2001, Working Draft #4, Express Pallet Payloads Interface Definition Document), has just been placed on our GSFC RPO Website (<http://rpo-iss.gsfc.nasa.gov/>).

IS-25: The Express Pallet allows for a smaller geometry payload than the JEM-EF (the JEM-EF allows a 1.85m length). Will the ULC be able to accommodate a full size JEM-EF payload, or will the payload size be limited to Express dimensions during launch and transfer?

The ISS program plans to have a carrier capable of carrying a normal (500 kg) JEM-EF payload to the ISS. The current design plan is for the ISS Program to develop a specially modified FRAM that the payload developer will integrate into the allowed JEM-EF payload envelope. The combined unit will then mount to the developed carrier. At this time, the ISS Program expects that this carrier will be a ULC that is derivative of an EXPRESS Pallet. As such, current payload developers should assume a EXPRESS Pallet type launch and landing loads environment. It appears that the ULC will accommodate 2 full size JEM-EF payloads with no additional limitations on their size.

IS-26: Is the Flight Releasable Attach Mechanism (FRAM) mentioned in the research opportunities document the "grapple fixture"? Has the status of the FRAM with respect to cost to the payload developer been resolved?

The term grapple fixture does not refer to a FRAM. Grapple fixtures are specific interface hardware used by the various robotic arms for moving a variety of hardware on orbit. The FRAM does contain a specific fixture that is used by the Station robotic arm with the Special Purpose Dexterous Manipulator (SPDM) to handle payloads. EXPRESS Pallet payloads on an adapter plate with a FRAM will not require any additional grapple fixtures.

Full truss payloads will require a Power Video Grapple Fixture (PVGF) for interfacing to the station arm and providing power to and video from the berthing cue system. The PVGF is provided by the ISS Program for full truss payloads. These payloads may also require an additional grapple fixture for the shuttle arm, depending on their transfer scenario from the shuttle to the truss and back. The shuttle grapple fixture is not provided by the ISS Program.

JEM-EF payloads will require a Flight Releasable Grapple Fixture (FRGF) for interfacing to the JEM arm. It has not been completely decided at this point if the FRGF will be provided by the ISS Program, but JSC has high expectations that it will be. The cost of an FRGF is approximately \$60K. As soon as we have a clear decision on the FRGF, we'll update this answer.

The FRAM for Pallet payloads and modified FRAM for JEM-EF payloads will be provided to payloads by the ISS Program. The FRAM hardware and Program provided grapple fixtures must be returned to the ISS Program post-flight.

I-27: Does the FRAM as envisioned provide the physical structure and attachment points for the FRGF and the PIU?

The FRAM has the fixtures used by the SPDM (fine arm essentially) of the Station arm. The FRAM's location on the payload is under discussion, but it looks like it's going to have to go on the side - starboard or port - of the payload and fit inside of the payload volume. A modified FRAM is being developed for JEM-EF payloads to fit within this volume. The PIU must be on the ram or wake end (depending on which side of the JEM-EF the payload is placed) to interface between the payload and the JEM-EF. It does not interface with the FRAM. The FRGF must be on the zenith side of the payload at a specific location closest to the JEM-EF in order for the JEM arm to be able to dock the payload. The FRGF does not directly interface with the FRAM or the PIU.

Specific locations can be found in the Introductory Guidebook for JEM-EF Potential Users and the JEM Payload Accommodations Handbook, both of which can be found under JEM-EF documentation on the RPO website at <http://rpo-iss.gsfc.nasa.gov/documentation/>.

I-28: A review of NASDA web sites identifies a Kibo Attached Payload BUS (APBUS) that appears to provide a structural framework for JEM-EF attached payloads. Will this system be compatible with the NASA provided FRAM and ULC? Is there a point of contact for more information about the APBUS?

Detailed information about the APBUS is provided in Appendix A of the Introductory Guidebook for JEM-EF Potential Users located under JEM-EF documentation on the RPO website at <http://rpo-iss.gsfc.nasa.gov/documentation/>. The APBUS is an optional payload shell designed by NASDA to carry experiments and provide the mechanical and avionics interface to the JEM-EF. Betsy Park is checking into the current status of the APBUS to see what NASDA's current plans are. The APBUS is intended to interface with the NASDA carrier, ELM-ES, which launches on the NASDA launch vehicle, the HTV. In order for the payload to return, however, it must be compatible the shuttle and hence with the FRAM and ULC. Betsy Park is checking on the compatibility status as well. Betsy Park is the POC for ISS Payloads; see the MIDEX Explorer Program Library for contact information.

INTERNATIONAL PARTICIPATION (IP)

IP-1: I need a clarification of the term “no-exchange-of-funds”. Can a foreign partner contribute dollars to a US PI? It would appear to be OK according to the first sentence of section 3.5.2. The PI would use this money to purchase US made hardware for the mission.

REVISED ANSWER (16-August-01)

The AO does not disallow the contribution of dollars to a US PI. A cost sharing contract could be established between NASA and the PI institution. The no-exchange-of-funds clause means that this contribution would be external to any international agreement that NASA might establish with the foreign partner. However a foreign partner may purchase US made hardware directly and contribute the hardware to the mission.

IP-1A: Can a foreign partner purchase hardware produced by the PI's employer and then provide it to the PI as a contribution?

REVISED ANSWER (16-August-01)

Yes.

IP-2: The instructions for dealing with the export laws and regulations (Section 3.6 in the MIDEX AO) are very complex. We have a non-US Co-I who is simply going to participate as a Collaborator, without providing any hardware. The collaborator would be supported by his home institution/country and would work with us strongly in data analysis and interpretation. What do we need to do? Can you provide us with boilerplate language?

Congress has placed spacecraft and space instrumentation on the list of “defense articles” and therefore made it necessary to obtain either a license from the State Department or an exemption from the license from NASA to discuss certain aspects of your mission. This is a matter of law, and you are subject to criminal penalties if you break this law. Generally, NASA can only grant exemptions for contractors (so we can grant an exemption when you have a Phase A contract, but we can not grant an exemption when you are writing your proposal), and the process of granting the exemption takes months due to the requirement for an agreement before an exemption is used. Exemptions are granted by establishing a Letter of Agreement or Memorandum of Understanding with a foreign institution, space agency, or government.

Therefore,

- You are on your own when you are writing your proposal.
- You are eligible for an exemption during Phase A, but I can not guarantee that NASA can get the exemption in place before Phase A ends.

Here is what you need to do.

- Determine whether you are going to “export” any “technical data” about “defense articles” and therefore fall under ITAR. The best way to do this is (i) ask your university lawyers and (ii) ask your prime contractor whether they are willing to have the collaborator in the room when they discuss spacecraft subsystems. If they are not willing, and you want the collaborator in the room, then you need to worry about ITAR.
- If all the collaborator is going to do is to analyze public science data, then generally you have no problem. If he is going to participate in designing and/or building the hardware, then you should investigate the situation carefully. Transfers of design/development technical data are generally subject to a license requirement.
- In your Draft International Participation Plan, outline how you will deal with the situation. Show that either (i) you will not export controlled data to the collaborator, (ii) you have a license to export controlled data to the collaborator (your university can get its own license from the State Department), or (iii) you will wait until NASA puts a LOA in place to export controlled data to the collaborator and you tell us what date you must have the LOA by or you can't execute the mission (that way we can consider the added risk to your schedule).
- In the proposal, describe the role that international partners have in the project.

- Section 3.6.4 of the AO addresses requirements for the Phase A study not the proposal.

If you are selected for Phase A, I will provide a boilerplate LOA for you to fill in. I don't believe that I can provide you with "boilerplate" proposal language for dealing with your international partners anymore than I can provide you with a boilerplate E/PO program.

IP-3: Where is the line separating "NASA is precluded from purchasing non-U.S. launch vehicles, nor may NASA funds provided to a mission team be used to purchase a launch vehicle from a non-U.S. source" and "direct purchase of supplies and/or services ... from non-US sources is permitted" (MIDEX AO section 3.6.1)? Can a non-US provider of a launch vehicle be paid for support services at the launch complex?

The domestic sources requirement (foreign sources prohibition) in MIDEX AO section 3.6.1 is not just national space policy but is statutory.

Except as otherwise provided in this section, the Federal Government shall acquire space transportation services from United States commercial providers whenever such services are required in the course of its activities. (42 U.S.C. 14731)

The statute is in terms of "space transportation services" which are also defined.

The term "space transportation services" means the preparation of a space transportation vehicle and its payloads for transportation to, from, or within outer space, or in suborbital trajectory, and the conduct of transporting a payload to, from, or within outer space, or in suborbital trajectory. The term "space transportation vehicle" means any vehicle constructed for the purpose of operating in, or transporting a payload to, from, or within, outer space, or in suborbital trajectory, and includes any component of such vehicle not specifically designed or adapted for a payload. (42 U.S.C. 14701)

So neither NASA nor the PI (using NASA funds) can contract with a foreign source for integration and other ground-based services deemed ancillary to flight, nor for standard components such as adapters.

IP-4: Do all the US institutions involved in the project need to get the license or just the PI institution?

A license is granted by the State Department to the PI institution. NASA would not be involved in the license procedure. Other institutions involved in the project can be included on the same license. Please check with your institutional lawyers.

IP-4A: If I understand question IP-2 correctly we do not need to have a LOA for the proposal.

That is incorrect. You may or may not need a license for the proposal. NASA can not provide you with a LOA for the proposal. Whether you need a license depends on what

you will be doing during the proposal period. Please check with your institutional lawyers.

IP-5: For a foreign partner's hardware delivery commitment, what level of letter do we need for the proposal? Do we need some endorsement from their funding agency or is the institutional head level sufficient?

See Section 3.6.3 of the AO and Section I-1 of Appendix B. "If government support is required, then a government endorsement is also needed." "Letters of endorsement must provide evidence that the institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. They must be signed by institutional and/or government officials authorized to commit their organizations to participation in the proposed investigation."

IP-6: Must letters of commitment from foreign agencies say that resources and funding have been allocated to this project, or is it adequate that the agency indicates support and states that funding will be evaluated if the project is selected by NASA?

Section 3.6.3 of the AO says, "The letter of endorsement must provide evidence that the non-U.S. institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA."

IP-7: There have been recent rumblings in the news about troubles getting an agreement in place between NASA and our foreign partner. Should this and associated matters be of concern to us?

Your plan for international cooperation will be evaluated along with the rest of your proposal. Any concerns with your plan for international cooperation, including concerns about specific international partners, will be taken into account by the Selecting Official as a programmatic consideration (see Section 7.3 of the AO).

IP-8: Are letters of endorsement required from all non-U.S. Co-Is, even if they will receive some funds from the MO&DA budget during the lifetime of the mission.

Letters of endorsement are required for all non-U.S. participants (Section 3.6.3 of the AO). However non-U.S. Co-I's may not receive NASA funding, even during the MO&DA phase of the mission, because all foreign participation is on a no-exchange-of-funds basis (Section 3.6.1 of the AO). The letter of endorsement should be from whoever is providing the funding for the non-U.S. Co-I (Section 3.6.3 of the AO).

BALLOONS (BL)

BL-0: Two new documents concerning Long Duration Balloon opportunities have been added to the MIDEX Explorer Program Library. These are *Long Duration Balloon Update Information Supplement* (which reports a cost increase for Russia overflights) and *Long Duration Balloon Options for Incorporation of NASA TDRSS High Gain Antenna and Supporting Subsystems*.

BL-1: Where and when do we obtain costs and capabilities for balloon services?

Costs and capabilities for balloon services may be found in the *MIDEX Long Duration Balloon Opportunities* document in the MIDEX Program Library. These costs will be updated by August 24 based on recent changes in the balloon program.

BL-2: Will there be a separate or additional evaluation panels or processes for balloon proposals?

No. Balloon proposals will be evaluated on their own merits in the same science and TMC panels as other MIDEX, ISS, and MO proposals. Both panels will be supplemented, as needed, with specialists on balloon payloads and missions.

BL-3: Are there any SR&QA requirements for balloon proposals? Where can we find them?

Yes, there are SR&QA requirements for balloon proposals. These requirements may be found in the *MIDEX Safety, Reliability, and Quality Assurance Requirements* document on the MIDEX Program Library.

BL-4: Since it is recommended that the MIDEX user plan to fund the construction of a new SIP tailored to his requirements, can a single SIP design support both Fairbanks and McMurdo LDB flights? If so, what would be its properties and cost?

A single SIP can support both Fairbanks and McMurdo. However, the two configurations as defined in the MIDEX “Long Duration Balloon Opportunities” document would remain unchanged. Antarctica would require TDRSS/HF and Fairbanks would require TDRSS/INMARSAT. To achieve this, an INMARSAT and HF communications system could be swapped out for each other depending upon the launch location. There would be no difference in the other “properties” to achieve this capability. The SIP configuration for both INMARSAT and HF are identical. Swapping out the INMARSAT and HF transceivers along with a few cables is all that is involved with configuring for either of these two launch sites. The INMARSAT and HF communications systems costs are about the same. If the science user wishes to procure a single SIP, an additional \$10K will support the option of flying the same SIP from either Fairbanks or McMurdo.

BL-5: Can you tell me if the lighter weight NiMH batteries have been qualified for LDB balloon flights?

I assume your question is with regard to using NiMH for “science” power. In which case, you have the option of using them or any other type power system of your choosing that you have demonstrated as qualified in accordance with MIDEX requirements. They are not qualified at this time for powering the SIP or other NSBF provided support systems. NiMH appear very attractive based upon their specifications. ULDB has been testing with NiMH but they are not qualified for our support systems per se, because the issue of having a qualified charge controller has not been resolved.

BL-6: Since we want to propose a project with several balloon flights from Antarctica, we would like to know, if we have to go through an extensive pre-deployment at Palestine each year, or would it be reduced (or is obsolete) for the second and third time. And, how much time should we schedule for it.

Every LDB flight requires pre-deployment integration with NSBF support systems at the NSBF prior to shipment. Even though payloads may have integrated and flown on previous LDB flights, integration at Palestine is still essential to insure that compatibility issues between science and NSBF support systems have been thoroughly addressed. LDB support systems are much more complicated than what users may have experienced with conventional NSBF line-of-sight support systems, which are normally integrated with science payloads at the launch site. Normally, with first time user's it is recommended that three to four weeks be scheduled at Palestine for integration. This assumes that the science payload arrives with all science to NSBF interfaces defined and in place. Normally, integration with payloads that have previously flown on LDB missions can be accomplished in two weeks time (barring any changes since the previous flight.) The above estimates do not account for how much time the science user must spend uncrating, assembling and making ready the instrument for full-up integration testing. Nor does it include time required for disassembly and re-crating of equipment following the pre-deployment integration and testing.

BL-7: Since we will send our own support people to McMurdo, we have to estimate the travel costs. From another project, we know that NSF might cover some of the expenses. Can you tell us what might be covered by NSF (Does the NSBF have any agreement with NSF or so) and how much travel cost we have to assume per person? In any case, is there a contact person at NSF to get more information?

The agreement with NSF is contained in a Memorandum Of Understanding with NASA. NSF only covers personnel travel costs from Christchurch to McMurdo and return from McMurdo back to Christchurch. NSF provides room and board and meals while in McMurdo. NSF point of contact for NASA LDB missions launched from McMurdo, Antarctica is Mr. Brian Stone. Brian can be contacted at bstone@nsf.gov.

BL-8: In the LDB Opportunities document it is said that “the NSF has to approve each specific science mission and they also levy certain requirements on all groups supported by them.” Could you please provide us with more details about these requirements.

NSF is a sponsoring partner with NASA, for all LDB missions launched from McMurdo, Antarctica. Science users should contact Mr. Brian Stone to determine any specific requirements that NSF may have regarding future mission planning that involves LDB launches from McMurdo. Because NSF provides a great deal of mission and operations support with air transport, payload recovery, and launch site support, users should discuss their unique requirements with NSF to insure they have NSF support for their mission and to insure that unique mission support requirements are being accounted for.

BL-9: What are the modes of transportation and the time durations for the transport of LDB + hardware from Palestine, Texas to McMurdo, Antarctica and back?

Shipment to Antarctica is performed after the integration at NSBF in Palestine, Texas is completed, and after the Mission Readiness Review has approved continuance of the mission. Science Equipment and NSBF LDB support systems are combined onto a shipment by truck from Palestine to Port Hueneme, California around the 28th of August each year, for Antarctica campaigns that are being conducted the following November – January season. NASA/NSBF covers the arrangements and cost for shipping from Palestine to Port Hueneme. Scientists only have to provide weather tight containers and perform their own packing of equipment following integration at Palestine.

National Science Foundation (NSF) provides sea shipment from Port Hueneme to Christchurch, New Zealand. From Christchurch, NSF takes care of moving equipment into McMurdo by air transport. The exact delivery date to McMurdo is contingent upon user's requests as well as the broader NSF support requirements. But typically, users can expect their equipment to be in McMurdo by the first to middle part of November. All users must coordinate with NSF concerning the specifics of their logistics and schedule.

Equipment that cannot be shipped by air must be delivered to Port Hueneme in November one year prior to its use in McMurdo. NSF arranges for sea shipment directly to McMurdo where it is off-loaded in January to await use the following Austral summer season. This is the method used by NSBF to move large gaseous helium tanks to McMurdo for use during the next campaign.

At the conclusion of each campaign, retrograde equipment is shipped by sea or by air from McMurdo, by way of Christchurch, and then arrives at Port Hueneme typically around mid-March. From there, each user must arrange for delivery of shipments to their home institutions, which usually is completed the first part of April.

Users should consult with NSF concerning pallet size and weight limitations that can be accommodated by air transport from Christchurch to McMurdo. NSBF has found that modified sea containers work very well for all modes of transportation to/from McMurdo. These containers should have outside dimensions no larger than 96 inches (height) X 96 inches (width) X 86 inches (length). These containers fit onto a single Air Force pallet (88 inches X 108 inches) and should not exceed 6500 pounds (2948 Kg). However, a weight penalty is incurred because these containers weight about 3000 pounds empty. But they provide superior protection from the elements and mitigate risks in handling. These should be used only for the most sensitive and perishable of equipment. Bulk items (i.e. large gondola frames, etc.) that are more robust should be shipped on pallets that can be merged onto one or two Air Force Pallets. Again, consult with NSF as they can best assist with defining shipment packaging, methods, and constraints. Before contacting NSF, please refer to additional Antarctica shipping and logistics information available at <http://www.polar.org/usapserv/ato/index.htm>.

BL-10: Is the returned LDB + hardware sent directly back to Palestine, Texas or directly to the experimenter's facility?

Science representatives at McMurdo can repack all return equipment with home institution address labels so that it gets returned directly to the science user without going to Palestine.

BL-11: At what point (i.e. location) is the experimenter responsible for having his LDB + hardware transported to his refurbishment facility?

See above.

BL-12: If an LDB payload was successfully launched on 1 December and fully recovered at McMurdo by 15 December, how “quickly” could the payload be returned to the point where the experimenter assumes responsibility for further transport to his facility? Also, where is that point (location) of transfer of responsibility?

Normally, equipment is shipped from McMurdo back to Christchurch by sea, sometime in February. From there, it is on-forwarded to Port Hueneme (to arrive mid-March) regardless of “when” the equipment can be relinquished by the user in McMurdo. This is because most flights returning from McMurdo to Christchurch are required to ferry passengers, leaving low priority or little space available for retrograde of equipment. However, arrangements can be made with NSF for priority air shipment of small articles, for example data archived on hard disk drives that require quick access for post mission analysis. Port Hueneme is the point in the U.S. where experimenters normally must assume responsibility for on forwarding of equipment to their home institutions.

BL-13: With regard to the above, is this point (location) after the clearing of US customs?

Once equipment comes through Port Hueneme, it has already cleared U.S. Customs. Refer to the information located within the USAP Participant Guide available from http://www.polar.org/pguide00_02/index.htm for additional information regarding the NSF Antarctica Program and Customs.

BL-14: On page 8 the maximum allowable science weights are listed as:

Antarctica: 4000 lbs

Fairbanks, Alaska: 3500 lbs

Karlsborg, Sweden: 2000 lbs.

Also listed on page 8 are weights for various LDB items such as:

- SIP and Thermal Shield: 380 lbs

- Ballast Hopper / Load Cell /Ballast Valves: 23 lbs

- etc.

All of these LDB items total 833 lbs. My understanding is that these LDB items on page 8 do NOT count against the maximum allowable science weights. Could you please confirm this assumption (or correct it)?

You are correct. The Maximum Allowable Science Weights listed on page 8 of the *Long Duration Balloon Opportunities* document in the MIDEX Program Library does not include the NSBF provided support systems such as the SIP, Ballast Hopper, LDB Solar Array, Rotator, etc., which totals about 833 lbs. However, it must include the science instrument, gondola structure, science power system, and anything else not normally provided by NASA/NSBF that is required for a particular LDB mission.

BL-15: What are the formal review requirements for LDB Missions of Opportunity? Traditional LDB programs have no required formal reviews except for the Mission Readiness Review. The AO says that the proposal requirements for a LDB Explorer

are the same as for a MIDEX proposal, but it isn't clear to us that the review requirements are the same.

Section 5.5 of the MIDEX AO says, “the proposal requirements for a LDB Explorer mission proposal are the same as for a MIDEX proposal.” Section 1.0 of the Balloon Appendix of the *MIDEX SR&QA Requirements* document (document 32 in the MIDEX Program Library) says, “It is expected that the Principal Investigator will conform to the MIDEX Assurance Requirements document when addressing safety, reliability and quality using specific alternatives addressed in this appendix.” In your proposal you should assume that the formal review requirements for LDB Explorers are identical to those of a MIDEX and that an LDB mission would be subject to all the formal reviews that are required of a full MIDEX or SMEX mission.

In Section 3.0, the *MIDEX SR&QA Requirements* document also says, “Independent balloon mission reviews will be conducted as described in the Balloon SR & QA Appendix. A more streamlined design review process is envisioned for balloon missions that are confirmed at significantly lower budget levels and/or which allow multiple flight opportunities. The Explorer Program Office, PI, and Systems Management Office will agree upon details of such reviews.” However, recently the Systems Management Office has applied the full Explorer requirements to low cost Missions of Opportunity. It is anticipated that LDB missions will also be required to undergo the same process.

BL-16: Our detector requires liquid helium. How is this provided in Antarctica?

This is normally handled by NSF and its support contractor for quantities of up to a few hundred liters. NSF takes care of arranging procurement and shipping of cryogenics and gases. NSF will arrange for delivery of these to the LDB staging facility at William's Field. All that is required of science users is to identify type, quantity, and transfer fitting requirements.

BL-17: Are we required to run our detector during compatibility testing at NSBF prior to shipment? If so, what is the best way of insuring that liquid helium is available at NSBF?

Yes, all flight systems need to be operated in their full-up mode to best insure the integrity and thoroughness of the NSBF LDB I&T prior to shipment. Arrangements for liquid helium can be made by NSBF through their usual supplier. Expendables procured by NASA should be accounted for in the budget.

BL-18: After recovering the gondola after a flight, it needs to be refurbished for the next flight. In case of only minor damages, it would be a waste to ship the complete gondola/instrument back to the PI's place. Are there possibilities to do most of the refurbishment in New Zealand, California, or in Palestine? Are there facilities we could possibly rent for this purpose? Are there programmatic problems associated with this approach (e.g., check-out of gondola by NSBF people prior of the required MRR)? This approach is considered to prevent unnecessary shipment of the equipment (lowering the chances of damages during shipping) and to increase available time for refurbishment between successive flights.

The NASA Balloon Program can only offer space at the NSBF in Palestine, Texas for performing “minor” refurbishment between flights. There are no facilities in New Zealand or California that the program can offer. Palestine is actually the better location, as it is a program requirement that LDB SIP integration and compatibility testing be done at NSBF in Palestine prior to every campaign. However, science users must realize there may be a limited amount of services and support compared to what they're normally accustomed to, i.e. no clean rooms, limited machine shop capabilities, etc. Typically, there is a relatively short period of time that equipment will be available to perform such turn-around refurbishment. Equipment returned from Antarctica (if recovered the same year) generally arrives in the U.S. around the first of April. LDB SIP integrations at NSBF typically occur no later than July with equipment being shipped to Antarctica in August. There will be no additional charge for use of space during this relatively short period, if science users elect to perform minor refurbishment at NSBF if flying in consecutive seasons.

MISCELLANEOUS (M)

M-1: Is it possible to reschedule the preproposal conference? If the preproposal conference must be on August 10, could our remote participation be accommodated with a telecon or videocon?

It is not possible to allow participation via telecon or videocon. The preproposal conference is a widely advertised meeting open to all potential proposers. It is not possible to fairly offer telecon or videocon capabilities to all potential proposers at this time.